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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,046	08/21/2003	Steven Don Arnold	H0004511	1546

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EXAMINER

TRIEU, THAI BA

ART UNIT	PAPER NUMBER
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3748

DATE MAILED: 02/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/647,046	Applicant(s) ARNOLD, STEVEN DON	
	Examiner Thai-Ba Trieu	Art Unit 3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2005.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-9,11-17,19 and 20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 3-9, 11-16, 19, and 20 is/are rejected.
7) ☒ Claim(s) 17 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 14, 2005 has been entered. Claims 1, 11, 13, and 16 were amended; and claims 2, 10, and 18 were cancelled.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 16 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Khair (Patent Number 5,771,868).

Khair discloses a method of providing exhaust gas recirculation to an internal combustion engine (11) comprising the steps of:

maintaining a pressure of cooled exhaust gas (via 45) produced by the engine (11), which gas has been previously filtered (via trap 29) and which has not passed through a turbine (15) at a first intermediate pressure less than a pressure at an intake manifold of the engine;

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increasing a pressure of intake air (by the compressor 18) to a second intermediate pressure; mixing the exhaust gas and intake air to form a mixture (via mixing valve 35); and

boosting the pressure of the mixture (by the compressor 23) to a pressure sufficient to meet a mass flow demand of the engine;

wherein the increasing step comprises compressing the intake air with a first stage (by the compressor 18) of a two-stage compressor (the first stage compressor 18 and the second stage compressor 22) (See Figure 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 5-9, and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gladden et al. (Patent Number 6,301,889 B1), in view of Khair (Patent Number 5,771,868).

Regarding claims 1 and 3, Gladden discloses an Exhaust Gas Recirculation (EGR) system providing a mixture of exhaust gas and intake air to the intake of an internal combustion engine, the system comprising:

a turbocharger (12) including a compressor (26) with more than one stage, wherein intake air is compressed in at least one first stage of the compressor (46, 50) ,

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and a mixture of intake air compressed in the at least one first stage of the compressor (46, 50) and exhaust gas, which exhaust gas has not passed through a turbine (24) is compressed in at least one second stage of the compressor (48, 56);

an EGR cooler (79);

wherein the compressor (46, 48) has two stages (See Figure 1).

However, Gladden fails to disclose a diesel particulate filter disposed to filter the exhaust gas before the exhaust gas enters the compressor and the location of an EGR cooler.

Khair teaches that it is conventional in the turbocharged internal combustion engine art having the exhaust gas recirculation system, to utilize a diesel particulate filter (29) to filter the exhaust gas and an EGR cooler (45) disposed to receive filtered exhaust gas from the diesel particulate filter (29) before the filtered exhaust gas enters the compressor (See Figures 1, Abstract, Column 6, lines 5-14).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized a diesel particulate filter and the location of the EGR cooler, as taught by Khair, to lower the particulate emissions of the exhaust gas before re-entering the engine, since the use thereof would have reduce exhaust emissions of the charged internal combustion engine.

Regarding claims 5-9 and 11, Gladden further discloses a control valve (82), which determines the proportion of exhaust gas produced by the engine to be recirculated (Column 4, lines 5-20);

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an EGR mixer (64) to mix the exhaust gas with intake air to form the mixture
(See Figure 1);

wherein the intake air is compressed by at least one first stage of the turbocharger to achieve a first intermediate pressure, the first intermediate pressure being less than an intake pressure at an intake manifold of the engine, and wherein back pressure from a turbocharger turbine maintains a pressure of the exhaust gas at a second intermediate pressure, the second intermediate pressure being less than an intake pressure at an intake manifold of the engine
(See Column 4, lines 34-46);

wherein the turbocharger comprises:

a turbine inlet (30) receiving exhaust gas from an exhaust manifold of an internal combustion engine and having a turbine exhaust outlet (33), and a compressor (26) having an air inlet (52) and a first volute(See Figure 1);

a turbine wheel (42) extracting energy from the exhaust gas, said turbine wheel (42) connected to a shaft (38) (See Figure 1);

a bearing (40) supporting the shaft (38) for rotational motion (See Figure 1); and

a compressor impeller (46, 48) connected to the shaft (8) opposite the turbine wheel (42), said compressor impeller (46, 48) having a first plurality of impeller blades (50, 56) mounted on a front face proximate the air inlet (52, 58), said first plurality of blades (50) increasing the velocity of

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air from the air inlet (52) and exhausting air into the first volute, said compressor impeller also having a second plurality of impeller blades (56) mounted on a back face, said second plurality of blades increasing the velocity of air from a scroll inlet connected to the first volute and a source of exhaust gas, and exhausting the mixture of exhaust gas and air into a second volute having a charge air outlet (via 74) connected to the engine intake (18);

wherein the second plurality of impeller blades (56) compresses the mixture to a pressure required by the engine to transit a desired mass flow (See Figure 1, Column 3, lines 9-67, and Column 4, lines 1-67, and Column 5, lines 1-27); and

at least one cooler (68, 79) (See Figure1).

Regarding claim 12, Gladden discloses the invention as recited above; however, Gladden fails to disclose at least one emissions control device.

Khair teaches that it is conventional in the turbocharged internal combustion engine art having the exhaust gas recirculation system, to utilize at least one emissions control device (Read as Catalyst) (See Figure1).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized at least one emissions control device, as taught by Khair, to improve the exhaust emissions in the Gladden device.

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Regarding claims 13-15, Gladden discloses an EGR system for an internal combustion engine wherein a turbocharger maintains a pressure of cooled exhaust gas at an intermediate pressure lower than a pressure at an intake manifold of the engine, wherein said intermediate pressure is greater than a pressure of intake air, the intake air having been compressed by a first stage of a two stage compressor (See Column 4, lines 34-46);

wherein the compressor (26) forms a part of a turbocharger (12);

wherein the exhaust gas and the intake air are mixed together to form a mixture (at 64), and the mixture is further compressed by a second stage of the two stage compressor (26) until the mixture reaches a pressure sufficient to meet a mass flow demand of the engine (See Column 3, lines 9-67, and Column 4, lines 1-67, and Column 5, lines 1-27).

However, Gladden fails to disclose a diesel particulate filter disposed to filter the exhaust gas.

Khair teaches that it is conventional in the turbocharged internal combustion engine art having the exhaust gas recirculation system, to utilize a diesel particulate filter (29) to filter the exhaust gas before the exhaust gas is being cooled by the cooler (See Figure 1).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized a diesel particulate filter, as taught by Khair, to lower the particulate emissions of the exhaust gas and then, to be cooled by the cooler,

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before re-entering the engine, since the use thereof would have reduce exhaust emissions of the charged internal combustion engine.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gladden (Patent Number 6,301,889 B1), in view of Khair (Patent Number 5,771,868), and further in view of Coleman (Patent Number 6,205,785 B1).

The modified Gladden device discloses the invention as recited above; however, fails to disclose the turbocharger being a variable geometry turbocharger.

Coleman teaches that it is conventional in the turbocharged internal combustion engine art having the exhaust gas recirculation system, to utilize a variable geometry turbocharger (46) (See Figures 1-2).

It would has been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized a variable geometry turbocharger, as taught by Coleman, to improve the control of the exhaust gas, in the modified Gladden device, since the use thereof would have increased the efficiency of the engine.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Khair (Patent Number 5,771,868), in view Gladden et al. (Patent Number 6,301,889 B1).

Khair discloses the invention as recited in the rejection of claim 16; however, Khair fails to disclose the structural details a turbocharger having a two-stage compressor connected to the turbine.

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Gladden teaches that it is conventional in the turbocharger art having an exhaust gas recirculation system, to utilize the turbocharger comprising:

a turbine inlet (30) receiving exhaust gas from an exhaust manifold of an internal combustion engine and a turbine exhaust outlet (33), and a compressor (26) having an air inlet (52) and a first volute (See Figure 1);

a turbine wheel (42) extracting energy from the exhaust gas, said turbine wheel (42) connected to a shaft (38) (See Figure 1);

a bearing (40) supporting the shaft for rotational motion (See Figure 1);

a compressor impeller (46, 48) connected to the shaft (38) opposite the turbine wheel (42) and said compressor impeller (46, 48) having a first plurality of impeller blades (50) mounted on a front face proximate the air inlet (52), said first plurality of blades (50) increasing the velocity of air from the air inlet (52) and exhausting air into the first volute, said compressor impeller also having a second plurality of impeller blades (56) mounted on a back face, said second plurality of blades increasing the velocity of air from a scroll inlet connected to the first volute and a source of exhaust gas, and exhausting the mixture of exhaust gas and air into a second volute having a charge air outlet (via 74) connected to the engine intake (18).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized disclose the structural details a turbocharger having a two-stage compressor connected to the turbine, to improve the compression capabilities, in the Khair device.

Allowable Subject Matter

Claim **17** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai-Ba Trieu whose telephone number is (571) 272-4867. The examiner can normally be reached on Monday - Thursday (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TTB
February 22, 2005


Thai-Ba Trieu
Primary Examiner
Art Unit 3748